REMARKS

A. OVERVIEW

Claims 1-44 were originally pending in the present application. Claims 28-44 have been withdrawn from consideration without prejudice to pursue them in a related application. The present response is an earnest effort to place all claims in proper form for immediate allowance. Reconsideration is therefore respectfully requested.

B. 35 U.S.C. § 112 REJECTIONS

Amendments have been made to dependent claims 5, 9, 10, 11, 12, 15, 16, 22, 24, and 25 in response to the § 112 rejections. It is respectfully submitted these changes remedy any definiteness in those claims.

Additionally, several of the claims have been amended to change the term "seeds" to "seed" to make the terminology consistent throughout all the claims.

It is respectfully submitted that all matters raised under § 112 have been remedied.

C. 35 U.S.C. § 102 REJECTIONS

Certain claims have been rejected as anticipated based on Bhide et al., U.S. Patent No. 6,150,158 ("Bhide"). Additionally, certain claims have been rejected as obvious based on either Bhide; Keller et al., U.S. Patent No. 6,705,827 ("Keller"); or Peeples, U.S. Patent No. 1,057,877 ("Peeples"). These rejections are respectfully traversed for the following reasons.

A brief discussion of these three cited references will be set forth below, followed by a discussion of the anticipation rejection. Thereafter, in a separate section, the obviousness rejections will be discussed.

I. The Cited References Are Distinguishable

a) Bhide, U. S. Patent No. 6,150,158

It is important to note that Bhide has, as its main object, improvement in the way intact plants can be grown in an indexed container to allow efficient scientific testing on the live, intact plants (see Bhide, col. 1, line 17). Bhide certainly describes a process by which a machine can, in automated fashion, grab seed and deposit individual seeds in individual wells of a microtiter plate (col. 2, line 48). It uses a moveable head consisting of a plurality of spaced-apart tubes to grab, by vacuum action, seeds from a collection of seed. Each tube grabs one seed. The spaced-apart positions correspond to one row of physical positions of wells in a microtiter plate. A computer-controlled x-y-z positioner moves the head to drop a single seed into each individual well of a row in the microtiter plate. The wells have nutrients for allowing the seed to germinate and grow into individual plants in each well. Later, tests can be conducted on live, intact plants.

Bhide describes its mechanized placement of one seed in each well and includes a description of how optical scanning can be used to detect if that placement is completed (col. 2, line 64 through col. 3, line 44). As can be seen at Figure 5A, the Bhide system relies on a computer-controlled x-y-z positioner, the correlated spaced-apart construction of the vacuum tubes relative to the wells of the microtiter plate, the physically partitioned and indexed wells of the microtiter plate, and calibrated, and a pre-determined, pre-calibrated physical space relative to the head and the plate, to allow the machine to pick up individual seed and move them, row-by-row, to corresponding rows of wells in the microtiter plate. The x-y-z positioner must be operated in a pre-programmed, highly controlled fashion to move seed, row-by-row, to fill up the wells in the microtiter plate.

The stated goal of the Bhide system is to improve the throughput for screening of intact, live plants grown from the seed deposited in the rows of wells of the pre-indexed microtiter plate(s). This avoids a worker to have to manually pick up seed and place them, one at a time, in individual wells of the microtiter plate. Thus, Bhide essentially discloses an automated system of picking up individual seed from a collection of seed, segregating individual seeds, and dropping one seed into each well of a physically indexed microtiter plate.

As can be appreciated, Applicants' claimed invention does not separate a collection of seed into individual seeds in individual locations. To the contrary, the problem it addresses is quite different. It processes a set of seed in batch mode through one or more operations performed on the set of seed, while maintaining identity of the set of seed. It does not utilize a pre-determined and pre-calibrated physical space or grid or use containers with indexing correlated to physical space or to positions in the container, like the x-y-z positioner and microtiter plate of Bhide. In the claimed invention, a set of seed is introduced to an input *en masse*. A unique identifier is assigned to each set before the input. The unique identifier does not require reference to any physical space or position in any indexed container. The set of seed is conveyed *en masse* or in a batch (not in singulated form). One or more operations is performed on the set of seed and then it is conveyed to an output, where a product derived from the set of seed is collected and correlated to the identifier assigned to the set before the input.

Therefore, unlike Bhide, which maintains correlation of the seed it conveys to a physical three-dimensional grid, because it is always conveyed by the x-y-z positioner, in Applicants' claimed invention, the physical space location is lost because each set of seed is introduced to an input and then accumulated at an output.

b) Peeples, U. S. Patent No. 1,057,877

The Peeples reference (issued in 1913) is basically a very old precursor to the microtiter plate of Bhide. Peeples discloses a box or pan 10 having compartments individually indexed in physical space essentially by row and column. Individual wells or compartments are created by U-shaped members 15 to provide individual wells for individual seed to be placed. Soil or nutrients are contained below the wells. Water interacts with the soil and seed, and a plant grows in each well from the seed. As stated at page 2, col. 1, lines 15-22, each seed is "retained in a separate chamber". The stated purpose of device 10 is to allow comparison of germinating power of different seeds in the controlled environment of box or pan 10.

Therefore, like Bhide, the Peeples reference teaches singulation of seed into individual wells for the purpose of growing individual plants. Observations about different seeds can be made by comparing the development of the individual plants in the physically segregated and indexed wells of pan 10. Thus, pan 10 allows correlation of each seed to a physical, two-dimensional grid. As discussed above, this is in contrast to Applicants' claimed invention, where physical space location is lost because each set of seed is introduced to an input and then accumulated at an output.

c) Keller, U. S. Patent No. 6,705,827

Keller has similarities to Bhide and Peeples in how it maintains a frame of reference in physical space by use of physically indexed containers. It is also like Bhide in that it discloses a robotic system that utilizes x-y-z positioning technology and a controller to allow robotic transfer of small particles, including seed. Like Bhide it uses vacuum power and a moveable head or probe (or probes) to move seed from one container to another.

Like Bhide, Keller also describes the problem it addresses as the intensive labor involved in seed sorting, seed weighing, and analogous tasks (col. 1, line 24). In its summary of invention, it describes its solution as a probe having a working end with a number of apertures corresponding to the number of seeds it desires to pick up and move from what it calls a donor area to a receiving area (col. 2, line 8 through line 34). Like Bhide, it intentionally uses vacuum power to pick a predetermined number of seed from a collection of seed at a first position and move that seed. Keller describes lifting seed with a probe out of a first jar or tube ("donor jar") and moving it with the x-y-z positioner to another jar or tube ("receiving jar"). It describes an option of moving the seed from the donor jar to a weighing station, weighing the seed, picking the seed up again with either the original probe or another x-y-z positioner probe, and then moving and depositing the seed in a receiving jar (col. 8, lines 52-67),.

Importantly, Keller describes using the probe(s) to pick up seed from jars or tubes at the donor area, where the jars or tubes are arranged in a physically indexed fashion (col. 5, line 16-44). Essentially, each jar or tube is in a physical matrix of rows and columns having *a priori* x-y or row/column position information. Each jar or tube essentially is identified by a column or row in a box or tray. Keller also recognizes such a tray could simply have wells like the Bhide microtiter plate (col. 5, line 45).

Thus, like Bhide, Keller relies on a sophisticated x-y-z positioner and vacuum probe that can very accurately be moved between any one of the indexed donor jars or tubes, withdraw a predetermined approximate number of seed from that indexed donor jar, and then move it to an indexed receiving jar at another location. The x-y-z positioner is pre-calibrated relative to the indexed physical space positions of the rows and columns of donor jars and the rows and columns of receiving jars. In the examples where seed is weighed on its way to a receiving jar,

the x-y-z positioner also must know the physical space location of the weighing device so that it can be programmed to accurately move there.

Keller does set forth several modes of transfer of the seed from donor location to receiving location (col. 10, lines 3-29). In one example, the "pooled sample" involves selecting a predetermined approximate number of seed from a donor jar and moving it to a receiving jar, then repeating in the sense that the xyz position or probe goes back to another donor jar, picks up that seed, and deposits it or pools it in the same receiving jar as the first set. Another version simply moves the limited number of seed from a donor jar into a receiving jar, moves back and picks up seed from a second donor jar and moves it to a second receiving jar and so on. But in both versions, the Keller system relies on the *a priori* calibration in physical space between the rows and columns of donor and receiving jars, and weighing station (if used) to allow the probes to know where to go.

In short, like Bhide, Keller's solution to handling of seed is a rather complex and sophisticated x-y-z positioner, vacuum probe, and a controller that relies on indexed donor jars and indexed receiving jars in known locations. As emphasized in Keller, its probe can only pick up an approximate amount of seed from the donor jars (col. 7, line 62). Despite Keller disclosing that it can move a plurality of seed with one probe head, unlike Bhide which intentionally picks up one seed per probe head, Keller still must rely on the physical space calibration of the x-y-z positioner and the physical space indexing of the donor jars and receiving jars relative to boxes or trays.

In contrast, Applicants' claimed invention loses knowledge of physical location. It does not have indexed boxes or trays with individual wells or jars or tubes.

2. Amended Claim 1

Applicants' claim 1 has been amended to more clearly set forth how it distinguishes from the approaches used by Bhide, Peeples, and Keller.

In particular, amended claim 1 adds emphasis to the following differences from the cited references:

a. The preamble specifies "[a] method of handling a plurality of sets of previously harvested seeds in batches through one or more operations upon the seed between an input and an output". As discussed above, one aspect of the present invention is the ability of processing batches of plural seeds through one or more operations on the seed itself. Bhide relates to performing operations on individual growing "intact" plants, not seed. Similarly, Peeples wants to observe variations in germination of growing individual plants.

b. Step (a) emphasizes "a unique identifier" is given each set of seed "prior to the input". Bhide does not disclose this, nor does Peeples. Keller contains sets of seed in individual jars or tubes.

c. Step (b) of amended claim 1 emphasizes each set of seed is conveyed segregated from other sets between the input and output "without reference to a container or a physical location in a coordinate system". Bhide, Peeples, and Keller have both—they use at least one indexed container which has rows and columns correlated to physical location. Additionally, Bhide and Keller have a robotic machine that moves the seed, but the machine has to be referenced to the containers and locations in physical

space to be able to "find" the containers and locations in the container, as well as any other location it is instructed to move to.

d. Step (c) emphasizes one or more operations are performed upon each set of seed "between the input and output", and further, specifically states that the way the method knows how to keep the sets segregated and not commingled is by "monitoring of one or more of (1) state of said conveying, (2) time, or (c) one or more operations relative to each said set of seed". Instead of monitoring position of a robotic arm relative to physical position, Applicants' method claim 1 keeps track of the state of conveyance, the time, or the state of operation(s) between input and output to estimate where each batch or set of seed is. It loses physical space location when the set of seed is introduced into the input. However, as discussed in the examples of Applicants' specification, sensors could track time, operation of the conveyor, or operation of any the operations to estimate how far each set has progressed, and control operation of the conveyance or operations to maintain separation of each batch to prevent commingling. This is a different and distinct approach to Bhide, Peeples, and Keller.

e. Step (d) emphasizes there is an accumulation of an end product "from each set of seed" at the output "after performing said one or more operations". It also requires "storing information about the end product plurality of seed correlated to the identifier." As described above, once each set or batch of seed enters the input, and loses any correlation to a physical space grid, the

operation(s) is/are performed on each set. An end product results, which sometimes can be less than the original number of seed in the set. In any event, the end product is automatically accumulated at the output. By the other steps of the method, its identity is known (by the method of tracking its progression between input and output). Thus, information about it can be stored because, at the output, identity of each set is correlated to the beginning unique identifier given at the input. Thus, the method knows when each set is done with the operation(s) upon it and its identity is preserved, even though its correlation to any physical space grid or container is lost after input.

f. Step (e) then emphasizes how the method allows tracking of progression of each set between input and output so that co-mingling is avoided between sets. This allows automation of the operation(s), whether it be on sequential batches of sets of seed or single batch processing without partial performance of operation(s) on the single batch. Step (e) also makes clear this can be done without tracking position relative to any predetermined physical space coordinate system or grid—which is what Bhide, Peeples, and Keller rely on.

Thus, claim 1 defines a combination of steps not disclosed in any of Bhide, Peeples, or Keller. It addresses the problem described in Applicants' specification and illustrates benefits and novelty of claim 1. The problem posed is: How does one maintain an identity of a loose set of plurality of seed upon which one or more operations are conducted? It is impractical to place a label or marking on each seed. Some of the operations contemplated literally discard some

seed from the set (*e.g.* sorting by size or shape), or can physically change some of the seed (*e.g.* cleaning the seed). It is antithetical to such operations to keep the set of seed contained in some container with a label on it. As shown in the exemplary embodiment, seed cannot be cleaned if held in a sealed container.

The amendments to claim 1 are based on and have full support in Applicants' specification, including some of the original claims. For example, original claim 3 describes aspects of tracking and segregating sets of seed. Claim 6 describes controlling progression of sets of seed while maintaining segregation between sets. Claim 10 describes tracking location between input and output. Claim 11 describes tracking based on deriving the state of operation(s).

To anticipate, a single reference must disclose each of the claimed elements or limitations, in the arrangement of the claim, as interpreted by one of ordinary skill in the art.

Thus, claim 1 is not anticipated by Bhide. Bhide discloses a system where individual seeds are essentially planted in individual wells of a multi well tray or microtiter plate (see Figure 5A). The seed is germinated and plants emerge in each well. The "operations" discussed in Bhide are therefore performed on individual plants. There is no question that individual kernels can be kept track of because they are placed in indexed positions in the microtiter plate. There is *a priori* knowledge of positions for each well. But Bhide does not disclose the method of claim 1, *inter alia*: (1) giving unique identifiers to each set of seed its x-y-z positioner head picks up each time; (2) conveying the sets of seed without reference to a container or a physical location in a coordinate system (*e.g.* its x-y-z positioner has to known where it is at in a 3-D coordinate system to be able to know where it moves to); (3) automatically accumulating an end product after tracking the set through the operation(s) and storing information about the end product.

Similarly, Peeples has no disclosure of the method steps of Applicant's claim 1. There is no disclosure of any automatic performance of one or more operations on a set of seed. There is no tracking of a set of seed from input to output or tracking by monitoring state of one or more operations performed on the seed. Additionally there is no automatic accumulation at an output of an end product and correlating the identifier of the seed with that end product.

Keller, likewise, does not disclose the steps of claim 1. It does not track and maintain segregation of each set of seed from other sets of seed where tracking is monitoring of state of one or more operations relative to each set of seed. Like Bhide, it uses the robotic x-y positioner to grab a set of seed from *a priori* known indexed donor jar and move it, and then go back and grab another set from another donor jar and repeat. Although Keller does disclose optionally performing a weighing operation on each set of seed, if desired, it does not monitor state of the operations relative to each set as described in Applicant's claim 1. Keller needs to know the position and state of its conveying mechanism, its robotic arm, to track where each set of seed begins and ends. It does not rely on monitoring the state of operations performed on each set.

This is apposite to claim 1 which specifically assigns an identifier to a set of plurality of seed. An operation is then performed on the set. The end product is a plurality seed that may or may not include all the original set. There is no identifier of container locations, such as the Bhide microtiter plate well locations. It is an identifier to the set. Additionally, amended claim 1 specifies that the correlation of the identifier of the set originally and the end product is a function of tracking the state of operations on the set. In other words, as given in the examples, the method keeps track of when the set enters or begins an operation and when it ends. Alternatively, it can keep track of when a set of seed is in a first location, and then a second location after the operation. This indirect method of tracking set, allows operations to be

performed on a plurality seed of the set and then an end product created that may not include the entire set as originally constituted.

A concrete example is as follows. A set of seed may be sorted. Seeds above a certain size from the set may be discarded. The end product or seed below a certain size. The method of claim 1 assigns a unique identifier to the set. It then keeps track of whether the set has been sorted or not. Specifically, the sensor can sense when the set enters the sorter and then leaves the sorter. By maintaining monitor of the state of the sorter relative to the set, the method knows the set has had the operation performed and can keep track of which set it is. This is without attaching some identifier to the set or any kernel in the set. It is without having to contain the set within some tray or container.

Bhide, Peeples, and Keller disclose different approaches. Bhide is directed to an apparatus and method for evaluating compounds for biological activity on plants (not seeds) (see col. 2, lines 18-20). The operations performed in the Bhide reference are assays to determine herbicidal or biological activity of applied compounds (col. 2, lines 63-67 and col. 3, lines 1-4). Bhide discloses how the compounds tested will either result in germination of the seeds (or not) for the operations and requires a single seed per container. Bhide segregates seeds into individual wells of 96-well microtiter plates, each seed of which is a single member of a larger set.

Peeples discloses a device that allows an adjustable number of wells for receiving and germinating individual seeds.

Keller discloses a robot to move particles from one place to the other. It, like Bhide, relies on an indexed, physical grid and/or container(s) in combination with an x-y-z positioner to know where its working head is at and where it is to go.

The solution to and the problem being addressed by claimed invention is pertinent in evaluating patentability of the claimed invention. It is respectfully submitted Applicant's claim 1 contains limitations that are not disclosed in the arrangement of claim 1 by Bhide. Therefore, it is respectfully submitted claim 1 is allowable over Bhide.

3. Dependent claims 2-14, 17, 18, 20, 23, and 26

Claims 2-14, 17, 18, 20, 23, and 26 are dependent from claim 1 and are submitted to be allowable for the reasons expressed in support of claim 1. However, there are independent grounds for allowability for many of these claims. For example, claim 2 requires segregating the set of seed from a second set of seed. Literally, this means that a set of seed *en masse* is identified but kept segregated from another *en masse* set of seed. In contrast, Bhide segregates each kernel of a set of seed from one another.

Claim 5 discusses conditions indicative of an error. Some of those conditions relate to over capacity of an operation, commingling of sets of seed, and other conditions not taught or disclosed in Bhide.

Claim 8 describes a progression of a plurality of sets of seed and specifically talks about "maintaining spatial separation of each set".

Claim 10 specifies tracking location of a set of seed between an input and output.

Claim 17 discusses specific operations. The operations are not identically disclosed in Bhide.

Claims 24 and 25 specifically describe the notion of the end product containing less than the original set of seeds. This is distinct from Bhide.

In conclusion, it is respectfully submitted that Bhide does not identically disclose Applicant's claims. It is directed to a different problem and docs not anticipate Applicant's claims.

D. 35 U.S.C. § 103 REJECTIONS

Claims 15 or 16 have been rejected as obvious based on one of Bhide, Keller, or Peeples, U.S. Patent No. 1,057,877 ("Peeples"). These rejections are respectfully traversed for the following reasons.

Claims 15 and 16 are dependent from claim 1 and are submitted to be allowable for the reasons expressed in support of claim 1. It is respectfully submitted that the immediately preceding section shows how specific limitations of Applicants' claim 1 are missing from each of the cited references. If any reference does not teach a critical limitation of a claim, it can not render the claim obvious unless it teaches or suggests or motivation to modify the reference to add the missing limitation.

Each of Bhide, Peeples, and Keller rely on indexed boxes or containers. Each of Bhide and Keller rely on an x-y-z positioner, and its known physical coordinate system to move seed. This teaches away from Applicants' claim 1, which does not rely on such physical phenomena, as discussed previously. In re Baird, 16 F.3d 380 (Fed. Cir. 1994) (finding of obviousness is not supported by reference that teaches away from claimed invention).

It is first respectfully submitted that none of Bhide, Keller, nor Peeples is analogous prior art for purposes of an obviousness determination. As described previously, nonc of these patents is addressing a specific problem addressed by Applicant's claimed invention -- how does one take a set of seeds, send it through one or more processes, and be able to track it without having

indexed, sophisticated positioners handle each set or having indexed trays, boxes, or containers. Bhide, Keller and Peeples have taken the approach of using the indexed containers. Bhide and Keller have taken the approach of using the sophisticated xy positioner robotic arm so that position of the arm relative to the index containers can be calibrated to know where everything is. Applicant's claims do not contain this and therefore the cited references, by not addressing the problem addressed by Applicant's invention, are non-analogous.

Moreover, none of the references teach Applicant's claimed invention. In fact, Bhide and Keller teach away from each other. Bhide discloses picking up single seeds and depositing them in single locations in an indexed container. Keller describes using a single probe to pick up multiple seed and deposit them in an indexed position in a container.

Peeples simply shows one version of an adjustable, indexed multiple compartment container (adjustable in the sense that the number of wells or index locations in the container can be adjusted by selection of the number of U-shaped walls).

It is therefore respectfully submitted that Applicants' claims 15 and 16 are not obvious in light of any of Bhide, Peeples, or Keller

E. CONCLUSION

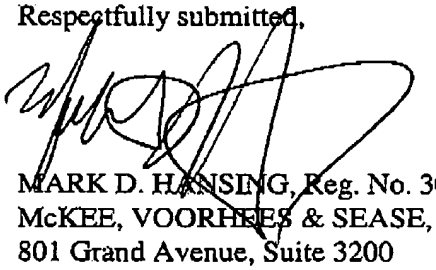
It is respectfully submitted that all matters raised by the Office Action have been addressed and remedied and that the claims are in form for allowance. Favorable action is respectfully requested.

If this response does not result in allowance of the application, the undersigned respectfully requests the courtesy of a telephonic interview before the issuance of any further written action in this application.

No fees or extensions of time are believed to be due in connection with this amendment; however, consider this a request for any extension inadvertently omitted, and charge any additional fees to Deposit Account No. 26-0084.

Reconsideration and allowance is respectfully requested.

Respectfully submitted,



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